

THAT WHICH IS CLAIMED IS:

1. A process to produce a composition of matter, said process comprising contacting an organometal compound, a treated solid oxide compound, and an organoaluminum compound to produce said composition,

wherein said composition consists essentially of a post-contacted organometal compound, a post-contacted treated solid oxide compound, and optionally, a post-contacted organoaluminum compound, and

wherein said composition can polymerize ethylene into a polymer with an activity greater than a composition that uses the same organometal compound, and the same organoaluminum compound, but uses untreated Ketjen grade B alumina instead of said treated solid oxide compound, and

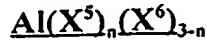
wherein said organometal compound has the following general formula



wherein M^1 is selected from the group consisting of titanium, zirconium, and hafnium, and

wherein (X¹) is independently selected from the group consisting of cyclopentadienyls, indenyls, fluorenyls, substituted cyclopentadienyls, substituted indenyls, and substituted fluorenyls, and wherein said substituents on said substituted cyclopentadienyls, substituted indenyls, and substituted fluorenyls, are selected from the group consisting of aliphatic groups, cyclic groups, combinations of aliphatic and cyclic groups, and organometallic groups, and hydrogen; and wherein (X³) and (X⁴) are independently selected from the group consisting of halides, aliphatic groups, cyclic groups, combinations of aliphatic and cyclic groups, and organometallic groups, and wherein (X²) is selected from the group consisting of Group OMC-I or Group OMC-II, and

wherein said organoaluminun compound has the following general formula.



wherein (X⁵) is a hydrocarbyl having from 1-20

carbon atoms, and

wherein (X⁶) is a halide, hydride, or alkoxide, and

wherein "n" is a number from 1 to 3 inclusive.

2. A process to produce a composition of matter, said process comprising contacting an organometal compound, a treated solid oxide compound, and an organoaluminum compound to produce said composition,

wherein said composition consists essentially of a post-contacted organometal compound, a post-contacted treated solid oxide compound, and optionally, a post-contacted organoaluminum compound, and

wherein said composition can polymerize ethylene into a polymer with an activity greater than 100 ($\text{gP}/(\text{gS} \cdot \text{hr})$), and

wherein said organometal compound has the following general formula



wherein M¹ is selected from the group consisting of

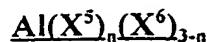
titanium, zirconium, and hafnium, and

wherein (X¹) is independently selected from the group consisting of cyclopentadienyls, indenyls,

fluorenyls, substituted cyclopentadienyls,
substituted indenyls, and substituted fluorenyls, and
wherein said substituents on said substituted
cyclopentadienyls, substituted indenyls, and
substituted fluorenyls, are selected from the group
consisting of aliphatic groups, cyclic groups,
combinations of aliphatic and cyclic groups, and
organometallic groups, and hydrogen; and
wherein (X³) and (X⁴) are independently selected
from the group consisting of halides, aliphatic
groups, cyclic groups, combinations of aliphatic and
cyclic groups, and organometallic groups, and
wherein (X²) is selected from the group consisting
of Group OMC-I or Group OMC-II, and

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15 wherein said organoaluminun compound has the following general
formula.



wherein (X⁵) is a hydrocarbyl having from 1-20
carbon atoms, and

20 wherein (X⁶) is a halide, hydride, or alkoxide, and

wherein "n" is a number from 1 to 3 inclusive, and
wherein said treated solid oxide compounds comprise oxygen and
at least one element selected from the group consisting of
groups 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, and 15 of
the periodic table, including lanthanides and actinides.

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3. A process according to claim 2 wherein said activity is greater than 250.
4. A process according to claim 3 wherein said activity is greater than 500.
5. A process according to claim 4 wherein said activity is greater than 1000.
6. A process according to claim 5 wherein said activity is greater than 2000.
7. A composition produced by the process of claim 2.

ANS
A3 > 8.

A process of using the composition of claim 7 to polymerize monomers into polymers.

9. A manufacture that comprises polymers produced according to claim 8.
10. A machine that comprises manufactures according to claim 9.
11. A process according to claim 8 wherein said polymers are produced under slurry polymerization conditions.
12. A process according to claim 11 wherein said polymerization is conducted in a loop reactor.

13. A process according to claim 12 wherein said polymerization is conducted in the presence of a diluent that comprises, in major part, isobutane.
14. A manufacture that comprises polymers produced according to claim 13.
15. A machine that comprises manufactures according to claim 14.
16. A composition produced by the process of claim 6.
17. A process of using the composition of claim 16 to polymerize monomers into polymers.
18. A manufacture that comprises polymers produced according to claim 17.
19. A machine that comprises manufactures according to claim 18.
20. A process according to claim 17 wherein said polymers are produced under slurry polymerization conditions.
21. A process according to claim 20 wherein said polymerization is conducted in a loop reactor.
22. A process according to claim 21 wherein said polymerization is conducted in the presence of a diluent that comprises, in major part, isobutane.
23. A manufacture that comprises polymers produced according to claim 22.
24. A machine that comprises manufactures according to claim 23.

25. A process to produce a composition of matter, said process comprising
contacting an organometal compound, a treated solid oxide compound,
and an organoaluminum compound to produce said composition,
wherein said composition consists essentially of a post-contacted
5 organometal compound, a post-contacted treated solid
 oxide compound, and optionally, a post-contacted
 organoaluminum compound, and
wherein said composition can polymerize ethylene into a polymer
with an activity greater than 2000 (gP/(gS·hr)), and
10 wherein said organometal compound is selected from the group
 consisting of
 bis(cyclopentadienyl) hafnium dichloride;
 bis(cyclopentadienyl) zirconium dichloride;
 [ethyl(indenyl)₂] hafnium dichloride;
 [ethyl(indenyl)₂] zirconium dichloride;
15 [ethyl(tetrahydroindenyl)₂] hafnium dichloride;
 [ethyl(tetrahydroindenyl)₂] zirconium dichloride;
 bis(n-butylcyclopentadienyl) hafnium dichloride;
 bis(n-butylcyclopentadienyl) zirconium dichloride;
 ((dimethyl)(diindenyl) silane) zirconium dichloride;
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((dimethyl)(diindenyl) silane) hafnium dichloride;
((dimethyl)(ditetrahydroindenyl) silane) zirconium
dichloride;
((dimethyl)(di(2-methyl indenyl)) silane) zirconium
dichloride;
bis(fluorenyl) zirconium dichloride, and

5 wherein said organoaluminum compound is selected from the
group consisting of

10 trimethylaluminum;
triethylaluminum;
tripropylaluminum;
diethylaluminum ethoxide;
tributylaluminum;
triisobutylaluminum hydride;
triisobutylaluminum;
diethylaluminum chloride, and

15 wherein said solid oxide compounds are selected from the group
consisting of Al_2O_3 , B_2O_3 , BeO , Bi_2O_3 , CdO , Co_3O_4 ,
 Cr_2O_3 , CuO , Fe_2O_3 , Ga_2O_3 , La_2O_3 , Mn_2O_3 , MoO_3 , NiO ,
20 P_2O_5 , Sb_2O_5 , SiO_2 , SnO_2 , SrO , ThO_2 , TiO_2 , V_2O_5 , WO_3 ,

Y_2O_3 , ZnO , ZrO_2 ; and mixtures thereof, and wherein said treated solid oxides have been treated with fluoride or chloride or both.

Al_2A_4

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